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Jawaharlal Nehru

“Step Out From the Old to the New”

IS 5947 (1970): Charts for recording meteorological instruments [PGD 21: Meteorological Instruments]

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Bhartṛhari—Nītiśākām

“Knowledge is such a treasure which cannot be stolen”





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*Indian Standard*

REAFFIRMED

2006

CHARTS FOR RECORDING  
METEOROLOGICAL INSTRUMENTS

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INDIAN STANDARDS INSTITUTION  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

Gr 5

August 1971

# *Indian Standard*

## CHARTS FOR RECORDING METEOROLOGICAL INSTRUMENTS

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*Indian Standard*  
CHARTS FOR RECORDING  
METEOROLOGICAL INSTRUMENTS

**0. FOREWORD**

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 4 September 1970, after the draft finalized by the Meteorological Instruments Sectional Committee had been approved by the Mechanical Engineering Division Council.

**0.2** In most recording meteorological instruments a pen rests lightly on a paper chart wrapped around a vertical cylindrical drum. The drum is rotated at a constant speed by a clock mechanism, and as the element to be recorded varies the pen makes an ink record on the chart.

**0.2.1** The chart generally consists of a grid of lines printed on good quality paper. The horizontal lines indicate the variable element, while the other indicating time are either straight vertical lines or approximate arcs of circles with radius equal to the length of the pen arm (measured from the axis of the pen arm spindle to the tip of the pen) and with their centres in the plane through the pen arm spindle parallel to the time axis. The accuracy of the lines printed on the paper as well as the properties of the paper and ink are important in obtaining a good record.

**0.3** With the increasing requirements for various types of charts for meteorological instruments in common use in the country and in the interests of standardization and of accuracy of records obtained with these instruments it has become necessary to formulate an Indian Standard for charts for meteorological instruments. The test and examination of all charts for meteorological instruments printed in the country will in future be the sole responsibility of ISI.

**0.4** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS:2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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\*Rules for rounding off numerical values (revised).

## 1. SCOPE

**1.1** This standard specifies the requirement for charts for use with the following meteorological instruments with either weekly or daily clockdrums:

- a) Raingauge, recording;
- b) Thermograph, bimetallic;
- c) Hair hygrograph; and
- d) Barograph, aneroid.

This standard does not include continuous roll charts for strip chart recorders.

## 2. DESCRIPTION

**2.1** The charts consist of rectangular sheets of paper with two sets of grid lines printed on it. Both grid lines are sub-divided to the extent required for obtaining the desired accuracy in the recording of time and the meteorological element. A tabular form for entering the comparative readings of the control instruments at fixed hours is printed, wherever necessary, on the reverse side of the chart.

## 3. TYPES

**3.1** The charts shall be either of the daily or weekly type as indicated below and suitable for use with the common recording meteorological instruments:

- a) Daily charts with a net recording length of 287.5 mm for the time scale of 25 hours corresponding to a length of 11.5 mm for one hour, or
- b) Weekly charts with net recording length of 287.5 mm for 7 days and 7 hours corresponding to a length of approximately 3.3 mm for two hours.

**3.2** Each chart shall have significant identification symbol as given below to denote whether they are daily or weekly and the name of the instrument for which it is meant:

DR1 daily raingauge chart of 10 mm range (Fig. 1)

DR2 daily raingauge chart of 25 mm range (Fig. 2)

DH1 daily hygrograph chart (Fig. 3)

DT1 daily thermograph chart (Fig. 4)

DB1 daily barograph chart (Fig. 5)

WH1 weekly hygrograph chart (Fig. 6)

WT1 weekly thermograph chart (Fig. 7)

WB1 weekly barograph chart for 175 mm high drum (Fig. 8)

WB2 weekly barograph chart for 90 mm high drum (Fig. 9)

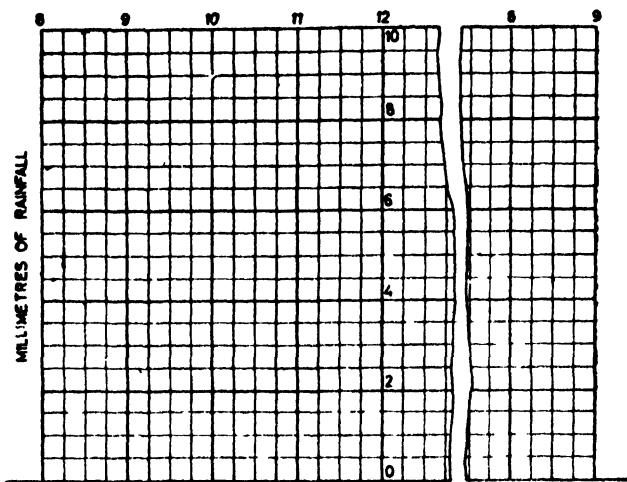


FIG. 1 DR1 DAILY RAINGAUGE CHART OF 10 mm RANGE

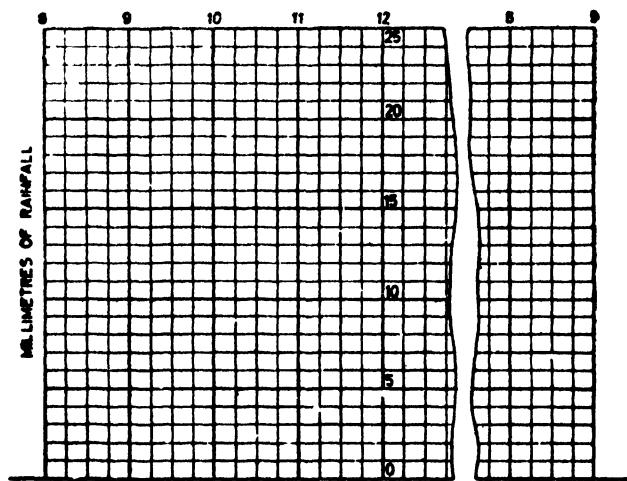


FIG. 2 DR2 DAILY RAINGAUGE CHART OF 25 mm RANGE

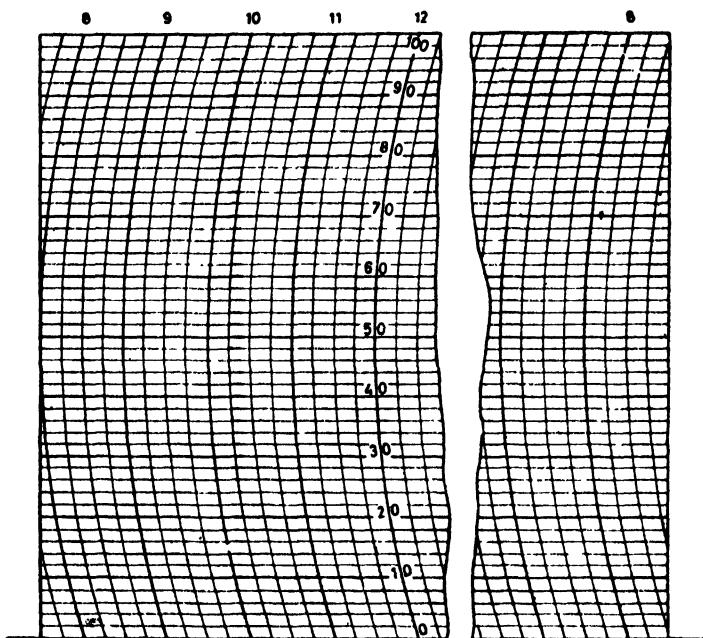


FIG. 3 DH1 DAILY HYGROGRAPH CHART

IS:5947-1970

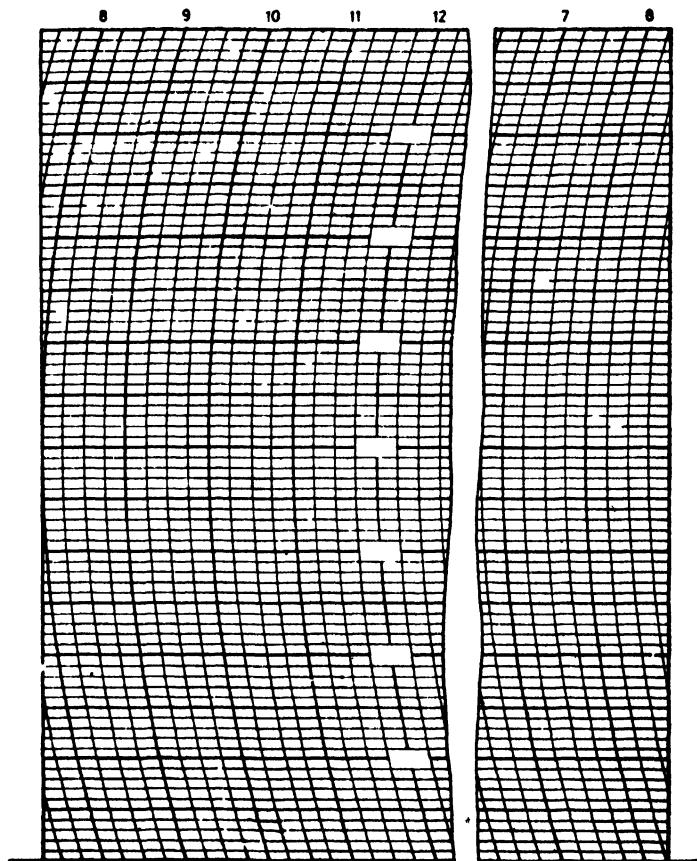


FIG. 4 DTI DAILY THERMOGRAPH CHART

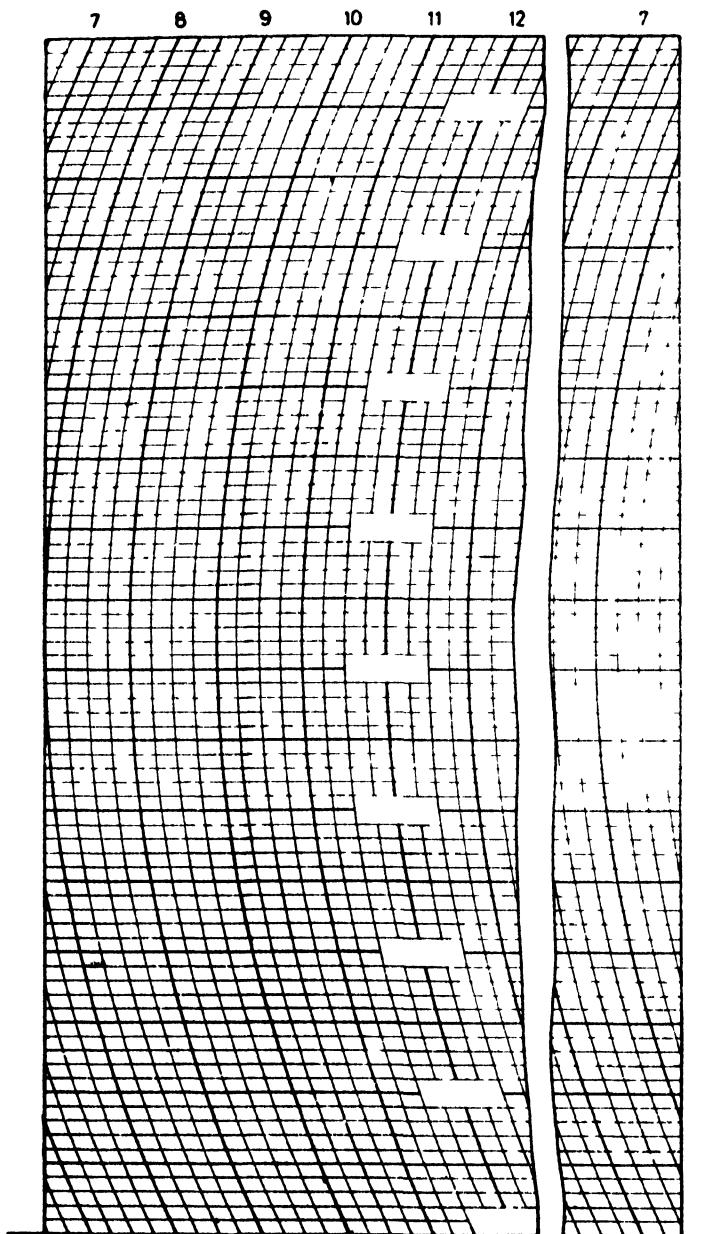


FIG. 5 DB1 DAILY BAROGRAPH CHART

IS: 5947 - 1970

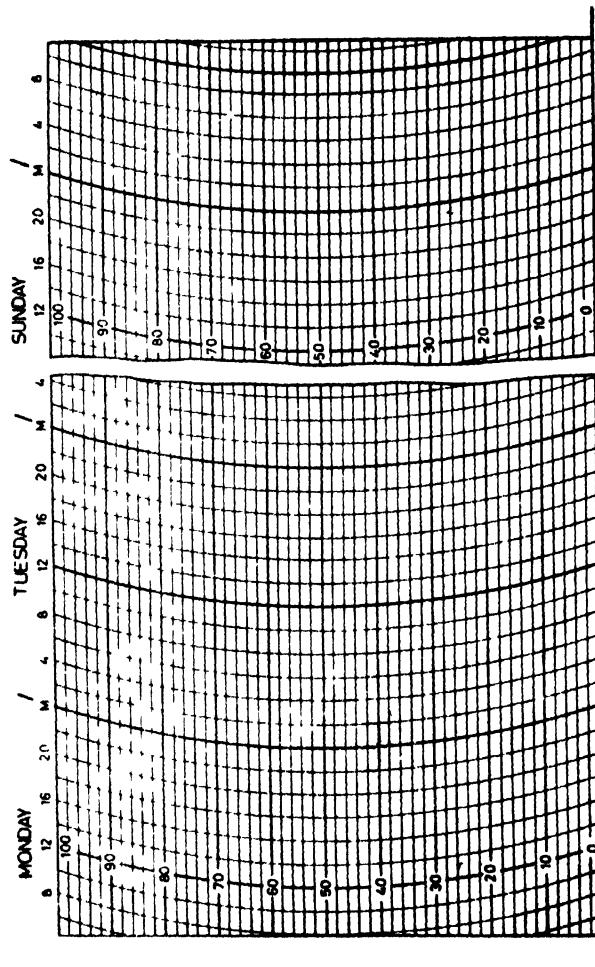


Fig. 6 WH1 WEEKLY HYGROGRAPH CHART

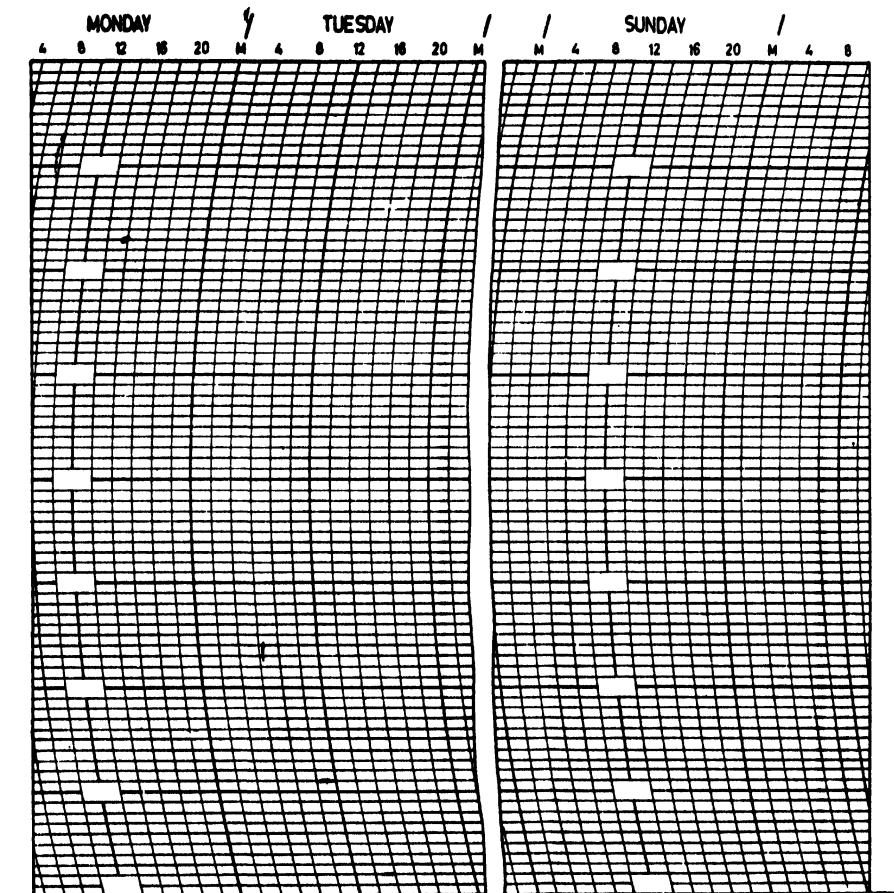


FIG. 7 WTI WEEKLY THERMOGRAPH CHART

IS:5947-1970

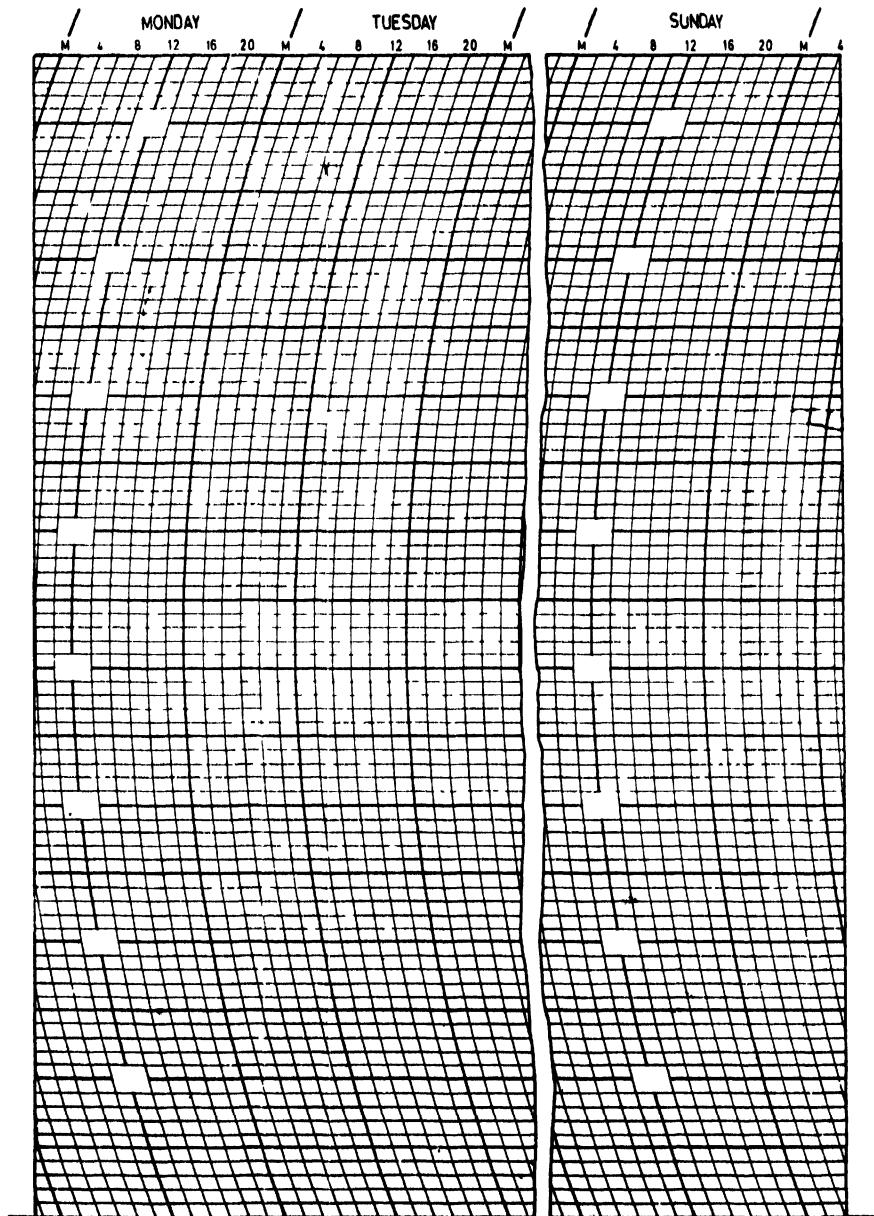


FIG. 8 WBI WEEKLY BAROGRAPH CHART FOR 175 mm HIGH DRUM

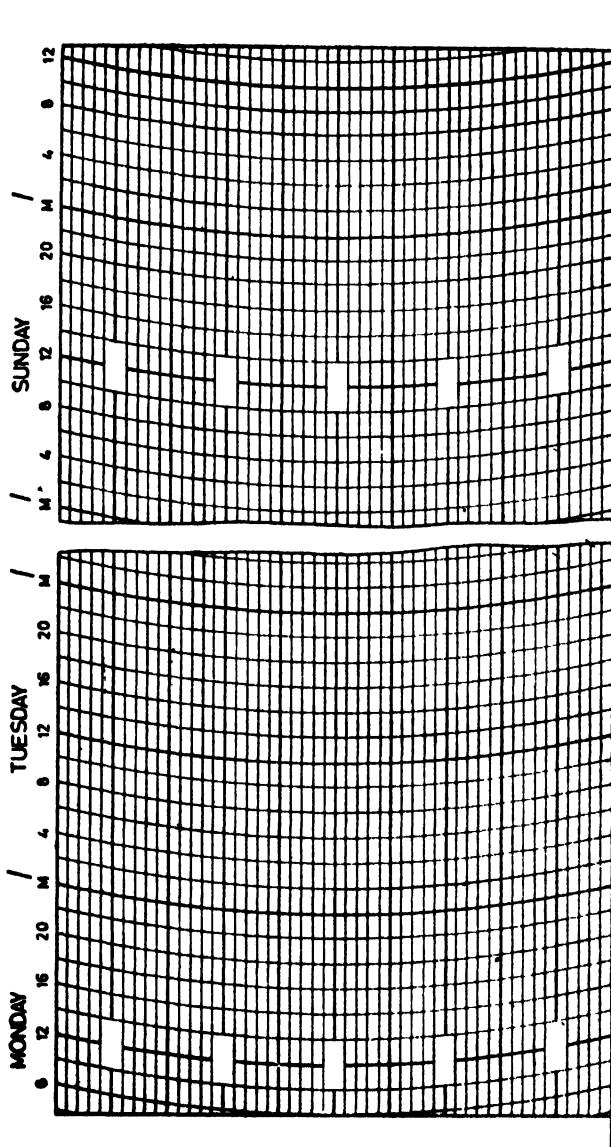


FIG. 9 WB2 WEEKLY BAROGRAPH CHART FOR 90 mm High Drum

#### **4. MATERIAL**

**4.1 Chart Paper** — The paper used for the printing of the charts shall be of a very high quality.

**4.1.1** Chart paper shall be uniformly white in colour, be hard sized and smooth in order to minimize friction between the paper and the pen. The two sides of the paper shall be the same in appearance, texture and colouration.

**4.1.2** Chart paper shall have a thickness of not less than 0.13 mm and not greater than 0.17 mm and have a weight of 22 kg for 500 sheets of size 56 cm × 76 cm.

**4.1.3** Chart paper shall show no tendency for the recording ink to spread on the chart even under conditions of 100 percent relative humidity.

**4.1.4** The paper when subjected to 100 percent relative humidity for a period of 12 hours and then allowed to dry, shall not show any tendency to warp, bend or change its shape in any manner. The dimensions of the chart particularly along the time scale shall not change by more than 0.2 percent when the relative humidity is changed from 50 to 100 percent.

#### **4.2 Ink for Printing Charts**

**4.2.1** The ink used for printing the charts shall be of any colour but a light green shade is preferred. The ink shall have a fast colour which will not fade on exposure or run or be otherwise affected by water or high humidity.

**4.2.2** The ink used shall be such that it does not react with the recording ink used in the pen to obtain the record. The record shall show no tendency to thicken or spread when it crosses the grid lines printed on the chart.

#### **5. DIMENSIONS**

**5.1** The dimensions of various charts are given in Table 1.

#### **6. FORMAT AND DETAILS**

**6.1** The overall length for all the charts shall be 335 mm. The overall width shall conform to the values given in Table 1.

**6.2** A space of 42 mm shall be provided on the left of the grid and of 5.7 mm at the right.

**6.3** The time grid shall be either straight parallel vertical lines as for charts DR1 and DR2 or parallel arcs of circles having the same radius as in charts DH1, DT1, DB1, WH1, WT1, WB1 and WB2. In the latter case, the arcs of the circles shall have the radii specified in Table 1. The centre points of the circles shall all lie on a straight line along the middle of the chart.

TABLE 1 DIMENSIONS FOR CHARTS FOR RECORDING METEOROLOGICAL INSTRUMENTS  
(Clauses 5.1, 6.1, 6.3 and 7.7)

CHART NUMBER	OVERALL LENGTH AND BANDWIDTH OF THE CHART SHEET	WIDTH OR RANGE OF THE CHART	TOTAL DIVISIONS CORRESPONDING TO	SMALL TIME INTERVAL FOR EVERY MINUTE	SCALE VALUE	SCALE OR ZERO	DISTANCE LINE FROM BOTTOM EDGE OF THE PAPER	REMARKS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DRI	325 x 88	60.0 mm	0-10 mm of rainfall	0.5 mm rainfall	15	2 mm rain = 12 mm	12 mm	Every hour denoted by a thick vertical line with hour figures at top. Every 2 mm rainfall scale line to be thick and figured at 4 places more or less equi-spaced along the length.
DR2	325 x 88	60.0 mm	0-25 mm of rainfall	1 mm of rainfall	15	5 mm rain = 12 mm	10 mm	Every hour denoted by a thick vertical line with hour figures at top. Every 5 mm rainfall scale line to be thick and figured at 4 places more or less equi-spaced along the length.
DHI	325 x 88	81.0 mm	0-100 percent relative humidity	2 percent relative humidity	15	10 percent RH = 8.1 mm	2 mm	Every hour denoted by a thick arc of a circle of radius 140 mm with hour figures at top. Every 10 percent relative humidity scale line to be thick and figured at 4 places more less equi- spaced along the length.
DT1	325 x 128	110.0 mm	40°C	0.5°C	15	5°C = 13.75 mm	2 mm	Every hour denoted by a thick arc of a circle of radius 185 mm with hour figures at top. Every 5°C line slightly thick and every 5°C scale line thicker and left unfigured. Blanks at four places more or less equi-spaced along the length shall be provided for entering appropriate values.
DBI	325 x 173	161.0 mm	85 mb	1 mb	15	5 mb = 9.47 mm	2.5 mm	Every hour denoted by a thick arc of a circle of radius 190.5 mm with hour figures at top. Every 5 mb scale line to be thick and left unfigured. Blanks at four places more or less equi-spaced along the length shall be provided for entering appropriate values.
WHI	325 x 88	81.0 mm	0-100 percent relative humidity	2 percent relative humidity	120 (2 hours)	10 percent RH = 8.1 mm	2 mm	Every 12 hour line to be a thick arc of a circle of radius 140 mm with figures for every 4 hours at top (4,8,12,...). Every 10 percent relative humidity scale line to be thick and figured at 4 places more or less equi-spaced along the length.
WTI	325 x 128	110.0 mm	40°C	0.5°C	120 (2 hours)	5°C = 13.75 mm	2 mm	Every 12 hours line to be a thick arc of a circle of radius 185 mm with figures for every 4 hours at top (4,8,12,...). Every 5°C scale line to be thick and left unfigured. Blanks at four places more or less equi-spaced along the length shall be provided for enter- ing appropriate values.
WBI	325 x 173	161.0 mm	85 mb	1 mb (2 hours)	120 5 mb = 9.47 mm	2.5 mm	Every 12 hour line to be a thick arc of a circle of radius 190.5 mm with figures for every 4 hour at top (4,8,12,...). Every 5 mb scale line to be thick and left unfigured. Blanks at four places more or less equi-spaced along the length shall be provided for entering appropriate values.	Every 12 hour line to be a thick arc of a circle of radius 190.5 mm with figures for every 4 hours at top (4,8,12,...). Every 10 mb scale line to be thick and left unfigured. Blanks at four places more or less equi-spaced along the length shall be provided for entering appropriate values.
WB2	325 x 88	75 mm	100 mb	2 mb (2 hours)	120 10 mb = 7.5 mm	2.5 mm		

Note—The chart WB2 not suitable for the instrument described in IS:5945-1970 Specification for barograph, aneroid.

**6.4** The mid point of the daily charts shall start with the 8 O'clock hour line or arc and end after 25 hours. The mid point of the weekly charts shall start with the 8 O'clock hour arc of Monday and end after approximately 7 days and 7 hours.

**6.5** In the weekly charts, the 00 hour arcs shall be extended beyond the grid and the days of the week shall be printed between them above the hour figures.

**6.6** The daily charts shall have every hour figured and the weekly charts shall have every 4 hours figured.

**6.7** The charts shall have provision made for entering the following information, either in the space available at left or at the top of the chart:

- a) Name of the station;
- b) Name of the instrument, its identification number and maker's name or recognized trade-mark;
- c) Date and time of starting the record; and
- d) Date and time of the removal of the record.

**6.8** The following information shall be printed on the chart at suitable convenient places :

- a) Identification number of the chart, for example 'Chart No. DR1';
- b) Name of the instrument, for example 'Recording Raingauge';
- c) Scale value of the time grid, for example '1 hour = 11.5 mm';
- d) Diameter of the drum with which the chart is meant to be used, for example 'Drum diameter = 93.3 mm';
- e) The pen arm radius, for those charts having curvilinear time grid, for example 'Pen radius = 140 mm';
- f) The legend 'Put over other end' in the blank space available at extreme right of the chart; and
- g) In those charts where the scale values are not printed, the total range of the chart and the equivalent of each small division, for example 'Total range of chart = 85 mb; one division = 1 mb'.

**6.9** An appropriate tabular form shall be printed on the reverse of the charts to enter the comparative readings of the control instruments, the corresponding values as obtained from the chart at different time and the correction to be applied to the chart values.

## **7. FINISH**

**7.1** The printing and final finish of the chart shall be of high quality. The grid lines shall be thin, fine and clear and of uniform thickness throughout.

**7.2** The various inscriptions, legends and the tabular form for entering the comparative readings of the control instrument shall be neatly and legibly printed.

**7.3** The general appearance of the chart shall be such that the record on it is easily discernible and the values at any time may be read from it easily without strain.

**7.4** Any blemish or colouration on the chart tending to spoil the white background shall be strictly avoided.

**7.5** The main hour lines and the scale value lines as well as the scale value figures, wherever printed, shall be easily distinguishable from the other lines.

**7.6** The cutting of the chart shall be accurate such that the two longer edges are parallel to each other and are perpendicular to the two shorter edges.

**7.7** The lower edge shall be truly parallel to the scale value lines on the chart and the distance between the edge and the lowest scale value line is exactly that specified in Table 1 all along the length.

## **8. MARKING**

**8.1** Each cardboard carton containing two polythene bags of 100 charts each shall be clearly marked with the following information:

- a) The number of the chart, for example, 'Chart No. DR1'.
- b) The total number of copies of the chart, for example, '200 charts'; and
- c) Lot number and date of printing.

**8.1.1** The carton may also be marked with the ISI Certification Mark.

NOTE—The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act, and the Rules and Regulations made thereunder. Presence of this mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard, under a well-defined system of inspection, testing and quality control during production. This system, which is devised and supervised by ISI and operated by the producer, has the further safeguard that the products as actually marketed are continuously checked by ISI for conformity to the standard. Details of conditions, under which a licence for the use of the ISI Certification Mark may be granted to the manufacturers or processors, may be obtained from the Indian Standards Institution.

## **9. PACKING**

**9.1** The printed charts of each type, in sets of 100 each shall be packed in a polythene cover and sealed. Two such covers shall be placed inside a cardboard carton and such cartons packed in a strong wooden box. Alternately, the charts may be packed as agreed to between the supplier and the purchaser.

## INTERNATIONAL SYSTEM OF UNITS ( SI UNITS )

### Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

### Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

### Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s <sup>2</sup>
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m <sup>2</sup>
Frequency	hertz	Hz	1 Hz = 1 c/s (s <sup>-1</sup> )
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m <sup>2</sup>

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